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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Olli Piirainen

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EXAMINER

LEE, SIU M

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/627,962	PIIRAINEN ET AL.	
	Examiner	Art Unit	
	SIU M. LEE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,8-12,15-20,25 and 26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,8-12,15-20,25 and 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 November 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/24/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-5, 8-12, 15-20, and 25-26 have been considered but are moot in view of the new ground(s) of rejection.

The examiner would like to point out that claims 25 and 26 was added in the amendment filed on 12/03/2008, therefore, the status of claims 25 and 26 should be corrected to "previously presented".

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 8-12, 15, 17-18, 20, 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunton (US 7,095,798 B2) in view of Chen et al. (US 5,963,091).

(1) Regarding claims 1, 8, 15, 17, and 18:

Hunton discloses a communication system comprising:

a transmitting apparatus configured to reduce a peak-to-mean ratio of a multi-carrier signal (the present invention provides a multi-carrier communication system

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employing a signal-peak suppression unit prior to D/A converter and radio frequency up converting modulator, column 10, lines 21-27);

generating a residual signal from a multi-carrier signal, the residual signal representing a difference between the multi-carrier signal and a hard-clipped multicarrier signal (figure 2 discloses a multi-carrier transmitter with a signal-peak suppression unit 110; the peak reduction calculation circuit in the correlation signal path calculates a peak reduction correction based on the input signal S and a signal peak limiting constant L , column 5, lines 52-55; a algorithm processor 140 (generator unit) calculates a complex correction vector C (residual signal) based on each sample of S and the signal peak limiting constant L , column 5, lines 55-65);

applying a function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier (the correction signal V_c is multiply by gain constant (g_1 to g_N) as shown in figure 3 to spread the correction signal into different bandwidth in order to minimize the V_F signal power to avoid degrading overall system communication quality, column 9, lines 41-46);

combining the minimized residual signal and the multicarrier signal (combiner 130 in figure 3, combiner 130 combined the filtered correction signal V_F with a time-delayed version of the input complex signal stream S , column 6, lines 7-9).

Hunton does not explicitly disclose applying a least square function to the residual signal to generate a minimized residual signal.

However, Chen et al. discloses using a recursive least square, RLS, calculator calculates these adjustment signals based on a recursive least square algorithm such

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that the error signal provided by the signal cancellation circuit is substantially orthogonal to the input signal to the linearizer.

It is desirable to applying a least square function to the residual signal to generate a minimized residual signal because it can provide stability and fast convergence rate (column 2, lines 21-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a least square calculator in the linearizer as taught by Chen et al. in the method of Hunton to improve the stability and process speed of the method.

(2) Regarding claim 2 and 9:

Hunton further discloses prior to the combining the minimized residual signals, filtering at least one minimized residual signal (correction filters 170 filter the gain multiplied correction signals before combining as shown in figure 3).

(3) Regarding claims 3 and 10:

Hunton further discloses delaying the multicarrier signal (delay 120 in figure 3 is delaying the multicarrier signal S as shown in figure 3), wherein the delayed multicarrier signal is combined with the minimized residual signal (the output of the delay 120 is combined with the summed output of the correction filters 170 as shown in figure 3),

(4) Regarding claims 4 and 11:

Hunton discloses wherein the generating the residual signal includes clipping the multicarrier signal to a predetermined level to thereby generate the hard-clipped multicarrier signal (the output of the switch 150 (Vc) represents the difference between

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the input signal stream S and a version of S hard limited to the amplitude L, column 5, lines 45-65).

(5) Regarding claims 5 and 12:

Hunton further discloses wherein the filtering comprises complex filtering (algorithm processor 140 which performs a complex vector calculation on the input samples to determine a complex corrector vector (V_C), column 3, lines 38-42, as the correction vector is a complex vector, the correction filter 170 will perform a complex filtering of the complex correction vector).

(6) Regarding claims 25 and 26:

Hunton further discloses wherein the complex filtering comprises applying at least one of a matrix function, a sampling function, a filter, and an interpolation function to the at least one minimized residual signal (the complex filtering comprises applying a correction filter 170 as shown in figure 3).

(7) Regarding claim 9:

Hunton discloses comprising a filter configured to filter each minimized residual signal prior to implementation of the combining (the gain multiplied correction signal V_C is filter by correction filter 170 before combining with the delayed signal S by combiner 130 as shown in figure 3).

(8) Regarding claim 20:

Hunton discloses the apparatus further comprising a filtering means for filtering minimized residual signal prior to implementation of the combining (correction filters 170 filter the gain multiplied correction signals before combining as shown in figure 3).

4. Claims 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunton (US 7,085,798 B2) in view of Chen et al. (US 5,963,091) as applied to claim 15 above, and further in view of Wright et al. (US 7,061,990 B2).

Hunton disclose all the subject matter as discussed in claim 15 that can be used in multi-carrier wireless communication system including cellular communication system, personal communication system, wireless local loop system and all other like system; except explicitly disclose the generating unit, applying unit and combining unit are implemented in a GSM EDGE mobile communication system.

However, Wright et al. discloses a multi-carrier wireless communication system including an Enhanced Data GSM system (column 1, lines 30-35).

It is desirable to implement the system in a GSM EDGE communication system because it provides higher speed data transmission. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement the peak power reduction system of Hunton in the GSM EDGE communication system of Wright et al. to improve the performance of the system.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Suzuki et al. (US 2001/0006359 A1) discloses a signal power dynamic range compressing circuit and power amplifier.

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Pajukoski (US 2005/0185736 A1) discloses a method for limiting signal and transmitter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIU M. LEE whose telephone number is (571)270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Siu M Lee/
Examiner, Art Unit 2611
8/25/2009

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/Chieh M Fan/
Supervisory Patent Examiner, Art Unit 2611